

**Temperature**  
**By**  
**SM 2550B (2010), 22<sup>nd</sup> edition**  
**AZPDES/APP Permit Field Methods**  
**Fall 2016 Workshops**



**Most common method deficiency in all plants inspected to date is that temperature is being measured on the pH meter inside of a lab area (not the compliance point).**

## Unacceptable Temperature Methods



pH Meter



DO Meter

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**Temperature must:**

- Be measured with either a glass or resistance thermometer (any other devices must be approved by the USEPA Region 9;**
- Be measured at the compliance point immediately.**
- Have working thermometers calibrated periodically with a NIST certified thermometer (correction factor if necessary).**
- Be done in duplicate at 10% frequency or every 10 samples.**



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# Resistance thermometer

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**Resistance thermometers**, also called **resistance temperature detectors** or **resistive thermal devices** (RTDs), are [temperature sensors](#) that exploit the predictable change in [electrical resistance](#) of some materials with changing temperature. As they are almost invariably made of [platinum](#), they are often called **platinum resistance thermometers** (PRTs). They are slowly replacing the use of [thermocouples](#) in many industrial applications below 600 °C, due to higher accuracy and repeatability.<sup>[1]</sup>

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**Partial Immersion Glass Thermometer**



**Total Immersion Glass Thermometer**  
**Not Usually Practical for Field!**

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Description	Length	Accuracy	Calibration Points	Divisions	Range	Immersion	Cat. No.	Unit	Price	Quantity
Mercury Filled	460 mm (18 <sup>1</sup> / <sub>8</sub> " )	±0.3°	0, 10, 20, 30, 37, 40, 50°C	0.1°C	-1 to 51°C	Total	61054-503	Each	\$757.81	<input type="text" value="0"/>
Spirit Filled	460 mm (18 <sup>1</sup> / <sub>8</sub> " )	±0.3°	0, 10, 20, 30, 37, 40, 50°C	0.1°C	-1 to 51°C	Total	89082-162	Each	\$623.41	<input type="text" value="0"/>
Spirit Filled	460 mm (18 <sup>1</sup> / <sub>8</sub> " )	±1°	0, 10, 20, 30, 37, 40, 50°C	0.1°C	-1 to 51°C	76 mm (3")	89082-160	Each	\$623.41	<input type="text" value="0"/>
Spirit Filled	610 mm (24")	±1°	0, 10, 20, 37, 40, 50, 56, 60, 70, 80, 90, 100°C	0.1°C	-1 to 101°C	76 mm (3")	89082-164	Each	\$767.75	<input type="text" value="0"/>
Mercury Filled	610 mm (24")	±0.4° to 100°C; ±0.5° above 100°C	0, 25, 37, 44.6, 100, 121, 140, 150, 180, 200°C	0.2°C	-1 to 201°C	Total	61222-532	Each	\$710.28	<input type="text" value="0"/>
Spirit Filled	610 mm (24")	±1°	0, 25, 37, 44.6, 100, 121, 140, 150, 180, 200°C	0.2°C	-1 to 201°C	76 mm (3")	89082-168	Each	\$652.57	<input type="text" value="0"/>
Mercury Filled	460 mm (18 <sup>1</sup> / <sub>8</sub> " )	±0.3°	0, 10, 20, 30, 37, 40, 50, 56, 60, 70, 80, 90, 100°C	0.1°C	-1 to 101°C	Total	61054-569	Each	\$802.57	<input type="text" value="0"/>
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Mercury Filled	305 mm (12")	±0.1°	0, 25, 30, 37°C	0.5°C	24 to 38°C	95 mm (3 <sup>11</sup> / <sub>16</sub> " )	61054-627	Each	\$676.23	<input type="text" value="0"/>
Easy-Read Fill	305 mm (12")	±1°	0, 37, 56°C	1°C	-20 to 110°C	Total	89082-158	Each	\$225.52	<input type="text" value="0"/>
										
Easy-Read Fill	300 mm (11 <sup>13</sup> / <sub>16</sub> " )	±1°	0, 37, 56°C	1°C	-20 to 110°C	76 mm (3")	89082-156	Each	\$225.52	<input type="text" value="0"/>
										

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Spirit Filled	610 mm (24")	±1°	0, 10, 20, 37, 40, 50, 56, 60, 70, 80, 90, 100°C	0.1°C	-1 to 101° C	76 mm (3")	89082-164	Each	\$767.75	<input type="text" value="0"/>
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# Temperature Calibration Records Required:

- physical paper or electronic record
- thermometer serial #
- temperature correction factor, if needed (used)
- units measuring – typically ° C
- date, month, year
- initials of person calibrating
- comments



*Serial numbers are on the back of the thermometers.*

GB Glass nitrogen filled Serial-No. 3359 PG **ENTCO** Made



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22<sup>nd</sup> Edition Removed this requirement.

TABLE 2020:II. SUMMARY OF ONGOING QUALITY CONTROL FOR METHODS IN PART 2000

	Section	Calibrate or Standardize	QCS	MB	LFB	Duplicates	LFM
2120B	Color	X	X	-	-	X	
2120C		X	X	-	-	X	
2120D		X	X	-	-	X	
2120E		X	X	-	-	X	
2120F		X	X	-	-	X	
2130B		X	X	-	-	-	
2150B	Odor	-	-	X	-	-	
2160B	Taste	-	-	X	-	-	
2170B	Flavor Profile Analysis	-	-	X	-	X	
2310B	Acidity	X	X	X	X	X	
2320B	Alkalinity	X	X	X	X	X	
2340C	Hardness	X	X	X	X	X	
2350B	Oxidant Demand/ Requirement	-	-	X	-	-	
2350C		-	-	X	-	-	
2350D		-	-	X	-	-	
2350E		-	-	X	-	-	
2510B	Conductivity	X	X	-	X	X	
2520B	Salinity	X	X	-	X	X	
2520C		X	X	-	-	X	
2540B	Solids	-	-	X	-	X	
2540C		-	-	-	-	X	
2540D		-	-	X	-	X	
2540E		-	-	X	-	X	
2540F		-	-	-	-	X	
2540G		-	-	X	-	X	
2550B	Temperature	X	-	-	-	-	
2560B	Particle Counting and Size Distribution	X	X	X	X	X	
2560C		X	X	X	X	X	
2560D		X	X	X	X	X	

# Field Video Demonstration



B - Temperature Video 1.wmv